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## Rice Fermentation Starters in Cambodia: Cultural Importance and Traditional Methods of Production

YAMAMOTO Sota\* and MATSUMOTO Tetsuo\*\*

### Abstract

This paper focuses on the processes of producing fermentation starters in Cambodia, in order to explore the dispersal routes of starters in Southeast Asia. Spices, herbs, and a sweet ingredient are widely used to make starters in Cambodia, and many people put new starters on rice husks or straw. These widely distributed techniques may have originated in one place and later dispersed throughout Southeast Asia. Two different production processes are used in Cambodia: one based on a “rice wine culture”—characterized by not using rice liquor, not using old starters, using leaves and branches to cover the starters, and not drying the starters; and the other based on a “rice liquor culture”—characterized by the use of rice liquor (blown over the starters), old starters (scattered over new starters and/or mixed with rice powder), and the addition of sugar without using plant materials. “Rice wine culture” seems to be the older type of process in Cambodia, and new techniques related to the “rice liquor culture” probably infiltrated the region later. The use of plants and the rituals related to starter production are very important in understanding the dispersal routes of starters in Southeast Asia.

**Keywords:** amylolytic starter, capsicum (chili peppers), charcoal, dispersal routes, ethnobotany, rice liquor, rice wine, spices

### I Introduction

Malted rice, or *koji*-cake—a fermentation starter in the form of a hard ball made from rice or other cereals—is thought to have originated in China, probably in the Yellow River basin [Hanai 1992: 62], 3,000–4,000 years ago [Ueda 1999: 89–90]. Used in food preparation and alcohol fermentation in various parts of Asia, it is known by several names, such as *men* in Vietnam, *paeng* in Laos, *look paeng* in Thailand, *marcha* or *murcha* in the Himalayan regions of India, *ragi* in Indonesia, and *bubod* in the Philippines. T.S. Raffles [1817: 81] reported that *ragi* was introduced into Indonesia by the Chinese in

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the ninth century; but the date of the introduction of starters and their dispersal routes throughout Southeast Asia remain unknown because there are few historical documents in this region, unlike in China, Korea, and Japan. Therefore, research on the similarities and differences in the techniques of starter production may provide a key to revealing starters' dispersal routes in Southeast Asia. Although there have been many microbiological studies on starters [e.g., Hesseltine *et al.* 1988; Tamang *et al.* 2007; Tamang and Fleet 2009; Tamang 2010a], there is little information on the production process in this region, partly because the techniques are often practiced as a hereditary trade that is secretly passed from parents to children.

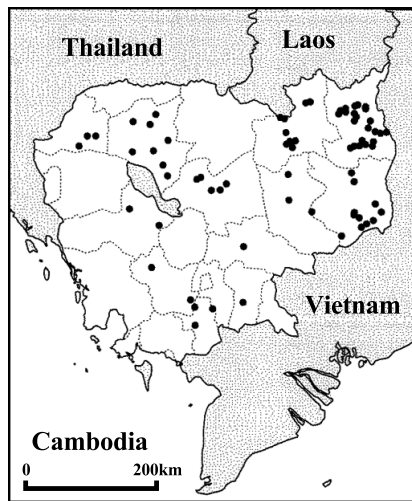
S. Yoshida [1993] tried to reveal the dispersal routes of fermentation starters by means of a field survey in Southeast Asia. He pointed out that the process of producing alcoholic beverages, including starters, in Borneo appeared similar to that used in mainland Southeast Asia, and he hypothesized that the use of charcoal and capsicum (chili peppers) in rituals related to alcoholic beverages might have been introduced into Borneo from the mainland after the 15<sup>th</sup> century [*ibid.*: 155–158]. However, his study contained no data, comments, or discussion on the production process of starters and related rituals in Cambodia, which lies between these two regions.

In Cambodia, the Khmer form the majority ethnic group. Other ethnic groups, such as the Khmer Khe (Khmer Khork), Suoy, Kuy, Brao, Krung, Kravet (Kavet), Lun, Tampuan, Phnong, Kachok (all of which belong to the Mon-Khmer language family), Jarai (Austronesian), and Lao (Tai-Kadai) live mainly in the northeastern part of the country [Center for Advanced Study 2009]. Homemade starters, including plant materials, are used for the production of fermented rice (called *tapae* in Khmer), rice liquor, and palm liquor among the Khmer, Suoy, and Lao, and rice wine among the other minority groups in the northeastern part of Cambodia. M. Kozaki [2007] reported one case of starter production among the Krung in northeastern Cambodia, but the information was very limited. M. Kato *et al.* [2006] discussed only the microflora of starters in Cambodia. Very little is known about the production processes of fermentation starters in Cambodia, and the traditional methods of production are now in danger of dying out because inexpensive starters imported from Vietnam and China are readily available.

This study aims to detail the production process, use of plants, and culture related to starters in Cambodia and to discuss the dispersal routes of starters in Southeast Asia.

## II Study Sites and Data Collection

We conducted fieldwork for a total of two months in August, September, November, and December 2008 in the Cambodian provinces of Banteay Meanchey, Siem Reap, Kampong Thom, Kampong Cham, Steung



**Fig. 1** Study Sites (●) in the Provinces of Banteay Meanchey, Siem Reap, Kampong Thom, Kampong Cham, Steung Treng, Ratanak Kiri, Kracheh, Mondoul Kiri, Pursat, Kampong Speu, Takaev, and Prey Veng, Cambodia

Treng, Ratanak Kiri, Kracheh, Mondoul Kiri, Pursat, Kampong Speu, Takaev, and Prey Veng (Fig. 1). We interviewed 69 local residents—24 men and 45 women, including 21 Khmer, one Khmer Khe, two Suoy, two Brao, six Krung, one Kravet, one Lun, five Tampuan, 16 Phnong, one Kachok, six Jarai, and seven Lao—using the Center for Advanced Study [2009] as a reference for identifying the ethnic groups. All interviewees were familiar with the production of fermentation starters or were still producing the starters, and they were questioned about the local names of starters, period of production, history of production techniques, production process (types and amounts of ingredients, use of old starters and/or rice liquor, covering and drying techniques, rituals, and taboos), and local names of plants used in the process. The interviewees were 27 to 80 years old, with a median age of 49. Some plants used for fermentation starters were observed in this survey, but the scientific names of most plants were taken from the *Dictionary of Plants Used in Cambodia* [Dy 2000] and *Medicinal Plants of Cambodia* [Kham 2004], with reference to local names stated by the interviewees.

### III Production Processes of Fermentation Starters

Local names for fermentation starters in Cambodia are shown in Table 1. The Khmer called them (*mae*) *dombae* or *mae sra* (meaning a liquor starter), and the Khmer Khe also called them *dombae*. The Brao, Krung, Kravet, Lun, and Tampuan called them *buh* or *puh*, both of which are very similar to the local

**Table 1** Local Names of Fermentation Starters in Cambodia

Local Names	
<u>Mon-Khmer</u>	
Khmer	<i>(mae) dombae</i> <i>mae sra</i>
Khmer Khe	<i>dombae</i>
Suoy	<i>krrow</i>
Brao	<i>buh</i>
Krung	<i>buh</i>
Kravet	<i>buh</i>
Lun	<i>buh</i>
Tampuan	<i>buh, puh</i>
Phnong	<i>(d)rry</i>
Kachok	<i>praa</i>
<u>Austronesian</u>	
Jarai	<i>pooy</i>
<u>Tai-Kadai</u>	
Lao	<i>paeng</i>

names used by the Katu, Ngeh, Ta'oi, and Alak (*bu* or *pu*) in Laos [Yoshida 1993: 141]. These local names seem common among the Mon-Khmer in the Annam Mountains. Some local terms, such as *praa* among the Kachok, *pooy* among the Jarai, and *paeng* among the Lao, seem to be cognates, but others (*krrow* among the Suoy and *[d]rry* among the Phnong) are of unknown origin.

Many Khmer interviewees (17 of 21) said that they began to produce starters just after the Pol Pot era of 1975–79. This was either because they could not produce them during that period or they tried to make money by producing them after that period. In general, Khmer initially produced starters mainly for the purpose of selling them or selling the rice or palm liquor made with them. Of the 21 Khmer respondents, 14 learned the process from their parents or relatives, but the others learned from non-relatives, some of whom were Vietnamese. Some even paid money or gold pieces to learn. Only three of the Khmer interviewees were still producing fermentation starters, and half of the respondents had stopped producing them more than 10 years previously. Some respondents stated that most people had stopped producing starters because inexpensive starters made in Vietnam and China were available in the market (Fig. 2-A), or they had other sources of cash income.

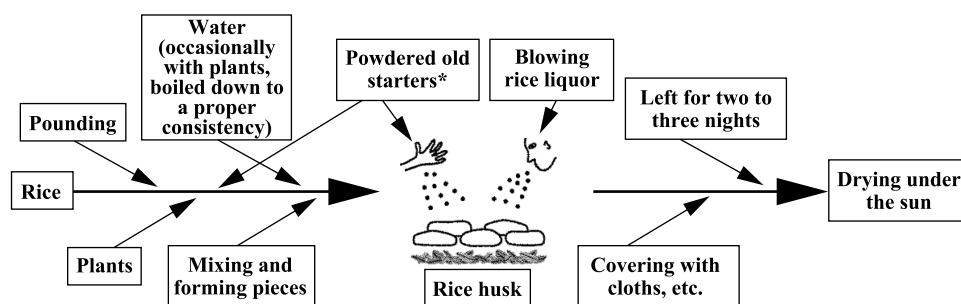
Unlike the Khmer, 39 of the 48 minority respondents answered that they had been producing starters for many years, and 27 of them were still producing them. However, some minority interviewees had recently stopped producing starters because of the tedious nature of production (especially pounding the rice and plants), difficulty in collecting the plants required, and easy access to markets where inexpensive starters were available—although many people complained that rice wine or liquor



**Fig. 2** Fermentation Starters in Cambodia

Note: Starters imported from Vietnam and China are sold in the market (A). A variety of homemade starters from Cambodia (B). The production process: preparing and mixing ground rice and plants (dotted circle) (C-1 and C-2), blowing rice liquor by mouth (C-3), scattering powdered old starters (C-4), placing a few planks across a bed and covering the new starters with mosquito nets for two nights (C-5), and the products after drying in the sun (C-6). A capsicum fruit put into a starter (D). Depressing the centers of starters (E). Putting *kateh* (cotton; indicated with the arrow) onto the starters while making a wish that mold will grow on them like the cotton (F). Starters kept in a bamboo container with capsicum fruits as an insect repellent (G).

made with Vietnamese or Chinese starters gave them a bad headache or stomach problems. Almost all of the minority respondents (46 of 48) learned the techniques of production from their parents or relatives. The production of fermentation starters among minority interviewees was typically for the purpose of home consumption of rice wine or liquor.



**Fig. 3** Schematic Diagram of the Process of Producing Fermentation Starters in Cambodia

Note: Type I, use of both rice liquor and old starters; Type II, use of old starters without rice liquor; Type III, use of rice liquor without old starters; and Type IV, no use of rice liquor or old starters.

\* Only scattering onto the new starters (Types I and II, Subtype 1); only mixing with rice powder (Types I and II, Subtype 2); both mixing and scattering (Types I and II, Subtype 3).

The basic production process of fermentation starters in Cambodia is shown in Fig. 3. The process was classified into the following four types, depending on whether rice liquor and old starters were used. Plant discriminating numbers are shown in Table 2. Distinctive techniques are underlined in the case studies.

*Type I: Use of both rice liquor and old starters (17 respondents)*

Subtype 1: Scattering old starters over new ones (seven Khmer, one Tampuan, one Jarai, and three Lao)

[Case 1] A 44-year-old Khmer woman from Trapeang Krasang, Sre Noy, Varin, Siem Reap, described the process as follows:

Take 10 kg of non-sticky rice → Soak it in water for 30 minutes → Pound it → Mix the rice powder with plant A<sup>1)</sup> and plant B<sup>2)</sup> and form into pieces (about 100 pieces 10 cm in diameter and 2 cm high; see Fig. 2-B) → Put new starters on rice husks → Depress the centers of the starters and put powder from old starters (0.5–1 kg) and plant C<sup>3)</sup> into the indentations → Blow rice liquor onto the new starters → Cover them with cloth for three nights → Dry them under the sun.

[Case 2] A 52-year-old Khmer woman from Rohat Tuek, Rohat Tuek, Mongkol Borei, Banteay Meanchey, described the process as follows:

1) #3, #8, #15, #17, #19, #27, #28, #33, and roots of *bangki*, *bongro*, and *eingse* (the total weight of all plants used was 3–5 kg) were soaked in water for two days, and the supernatant solution was used.

2) 3) #1 (300 g), #4 (300 g), #6 (500 g), and #7 (two kinds: 500 g of *khnhéi tek* and 1 kg of *khnhéi plēng*) were pounded and put into water (nearly 300 ml), and the strained-out leaves (plant B) and liquid (plant C) were used.

**Table 2** Plants and Other Materials Used for Fermentation Starters

	Local Name <sup>1)</sup>	Scientific Name	No. of Users (n=69)	Plant Parts
#1	<i>m'tés</i>	<i>Capsicum annuum</i> , <i>C. frutescens</i>	57	fruit, calyx
#2	<i>rum'dé:ng</i> (including <i>rum'dé:ng srók</i> and <i>rum'dé:ng prei</i> )	<i>Alpinia galanga</i> , <i>Alpinia</i> spp.	51	tuber, stem
#3	<i>chhē 'aēm, voēr 'aēm</i>	mainly <i>Albizia myriophylla</i> , including <i>Cinnamomum cassia</i> etc.	44	bark, root
#4	<i>m'rē:ch</i>	<i>Piper nigrum</i>	27	dried fruit
#5	<i>āmpōw</i>	<i>Saccharum officinarum</i>	26	stem, leaf
#6	<i>khtūm sâ:</i>	<i>Allium sativum</i>	25	bulb
#7	<i>khnhéi</i> (including <i>khnhéi tek</i> and <i>khnhéi plē:ng</i> )	<i>Zingiber officinale</i>	16	tuber
#8	<i>chhē plē:ng</i>	unidentified	10	bark
#9	<i>*saogn, chuogn</i> (Phnong)	charcoal	10	—
#10	<i>*ngam</i> (Jarai, Tampuan), <i>ngamngaam</i> (Tampuan)	unidentified (a climbing thorny plant with a sweet stem)	9	stem, root
#11	<i>déi phléi</i>	<i>Piper retrofractum</i>	7	dried fruit
#12	<i>phka chan', pôch kak law haw</i>	<i>Illicium verum</i>	7	dried fruit
#13	<i>thnam' chuëk</i>	<i>Nicotiana tabacum</i>	6	dried leaf
#14	<i>*chonrok</i> (Krung), <i>chondok</i> (Brao), <i>chondorodorok</i> (Lun)	Zingiberaceae ( <i>Boesenbergia pandurata?</i> )	5	tuber
#15	<i>kráva:nh</i>	<i>Amomum krervanh</i>	4	fruit, tuber
#16	<i>*phratandang</i> (Krung), <i>chophkrong</i> (Kravet), <i>phiapheh phishang</i> (Kachok)	<i>Solanum</i> spp.	4	fruit, leaf, root
#17	<i>smau kráva:nh chru:k, smau se</i>	<i>Cyperus rotundus</i>	4	root
#18	<i>chaplu:</i>	<i>Piper lolot</i> or <i>Piper sarmentosum</i>	3	root
#19	<i>chē:ng cha:b</i>	<i>Dasymaschalon lomentaceum</i>	3	root
#20	<i>donkay</i>	<i>Lepisanthes rubiginosa?</i>	3	stem, root, leaf
#21	<i>khnaō(r)</i>	<i>Artocarpus heterophyllus</i>	3	leaf
#22	<i>*mboong</i> (Krung)	unidentified	3	root, stem, leaf
#23	<i>*phrit</i> (Phnong), <i>bhrit</i> (Brao)	<i>Musa</i> spp.	3	root, pericarp
#24	<i>prēah khlā:b</i>	<i>Mimosa</i> spp. ( <i>M. pudica?</i> )	3	root
#25	<i>tep tiēru:, teppiru:</i>	<i>Cinnamomum</i> spp. ( <i>C. cambodianum</i> , <i>C. tetragonum</i> , etc.)	3	bark
#26	<i>*maak phao</i> (Lao)	<i>Cocos nucifera</i>	2	root
#27	<i>kākāhs</i>	<i>Sindora siamensis</i>	2	fruit
#28	<i>krāvan' (or rumduēl)</i>	<i>Mitrella mesnyi</i>	2	stem
#29	<i>law haw (pôch kak)</i>	<i>Myristica fragrans</i>	2	dried fruit
#30	<i>loloook</i>	the nest of <i>loloook</i> (a kind of turtledove)	2	—
#31	<i>nhō</i>	<i>Morinda</i> spp.	2	root
#32	<i>*pea chaa:b</i> (Tampuan) ( <i>trathok prei</i> in Khmer)	<i>Costus speciosus?</i>	2	root
#33	<i>phlēang, phlang</i>	<i>Glycosmis pentaphylla</i>	2	root
#34	<i>rumdenh miēhs</i>	<i>Prismatomeris tetrandra</i>	2	root
#35	<i>*sla:</i> (Lao)	<i>Areca catechu</i>	2	root
#36	<i>smach'</i>	<i>Melaleuca cajuputi</i>	2	stem
#37	<i>āngkāt khmau</i>	<i>Diospyros bejaudi</i>	1	root
#38	<i>chumpu:</i>	<i>Syzygium jambos</i> or <i>S. malaccense</i>	1	heartwood, root, leaf
#39	<i>kānh chē ba:y da:ch</i>	<i>Capparis micracantha</i>	1	root
#40	<i>khvōt</i>	<i>Limonia acidissima</i>	1	bark
#41	<i>klām' pu:, kham' phlu:</i>	<i>Syzygium aromaticum</i>	1	bud
#42	<i>kōki</i>	<i>Hopea</i> spp. ( <i>H. odorata?</i> )	1	root
#43	<i>kōor</i>	<i>Ceiba pentandra</i>	1	dried flower
#44	<i>*khua khao hor'</i> (Lao)	<i>Tinospora crispa</i>	1	—
#45	<i>mchul miēhs</i>	<i>Ixora</i> spp.	1	root
#46	<i>m'rē:ch tōnsa:y</i>	<i>Baechea frutescens</i>	1	root
#47	<i>m'rēahs prōw</i>	<i>Ocimum tenuiflorum</i>	1	stem, leaf
#48	<i>*phoo kiau</i> (Lao)	<i>Piper betel</i>	1	dried leaf
#49	<i>sdau</i>	<i>Azadirachta indica</i>	1	bark
#50	<i>smau kāntroëy</i>	<i>Chrysopogon aciculatus</i>	1	root
#51	<i>smau' phluk</i>	<i>Panicum repens</i>	1	root
#52	<i>*thaloong</i> (Phnong)	<i>Carica papaya</i>	1	fresh root
#53	<i>*yar hua</i> (Lao)	<i>Smilax glabra</i>	1	root

Note: <sup>1)</sup> Plants used by minority people only are indicated with an asterisk. The other plants show only the local Khmer names, which were referred to Kham [2004] and Dy [2000].



Take 5 kg of non-sticky rice → Soak it in water for 10–20 minutes → Pound it → Mix the rice powder with plants<sup>4)</sup> and rice liquor (no water) and form into pieces (about 50–80 pieces, 10 cm in diameter and 2–3 cm high) → Put new starters on rice husks → Blow rice liquor onto the new starters → Scatter powdered old starters (five or six pieces) → Cover with mosquito nets for three nights (she would also put the fruits of *Capsicum* spp. and a few pieces of charcoal on and around the mosquito nets to protect them from *app*, a kind of evil spirit) → Dry under the sun for four to five days.

[Case 3] A 55-year-old Lao man from Veun Sai, Veun Sai, Veun Sai, Ratanak Kiri, described the process as follows:

Take 1.5 kg of sticky rice and 1.5 kg of non-sticky rice (mixed together) → Soak it in water overnight → Pound it → Mix the rice powder with plants<sup>5)</sup> and water and form into pieces (3–4 cm in diameter; also make one big piece per flat basket to provide “old starter” for the next starter production) → Put new starters on rice husks in three flat baskets → Scatter old starters (three big pieces, one piece per flat basket) → Blow rice liquor onto the new starters while uttering a charm → Cover with banana leaves for three nights → Dry under the sun for two to three days.

#### Subtype 2: Mixing old starters with rice powder (two Khmer and one Lao)

[Case 4] A 55-year-old Lao woman from Samkhuoy, Samkhuoy, Sesan, Steung Treng, described the process as follows:

Take 3 kg of sticky rice → Soak it in water for two hours → Pound it → Mix rice powder with plants,<sup>6)</sup> powdered old starters, and water and form into pieces (3–4 cm in diameter) → Put new starters (occasionally on rice husks; husks are not required every time) in flat baskets → Blow rice liquor onto the new starters → Cover with rice sacks for three nights → Blow rice liquor onto the starters again, scatter the ashes of banana leaves, and cover again for three nights → Dry under the sun for two to three days.

#### Subtype 3: Both mixing and scattering old starters (one Khmer and one Tampuan)

[Case 5] A 54-year-old Khmer woman from Kab Dai, Prasat, Varin, Siem Reap, described the

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4) #1 (200 g), #2 (2–3 kg), #4 (200 g), #6 (200–300 g), #11 (200 g), #18 (500 g), #38 (3 kg), and #47 (3–5 kg) were dried and pounded.

5) #1 (500 g), #2 (200–300 g), #3 (500 g), #5 (leaf 500 g), #6 (300 g), and #13 (100 g) were dried and pounded.

6) #1 (50–60 fruits), #2, #3, #4, #6, #13, #18, #26, #35, and #44 were dried and pounded.

process as follows (the whole process was observed; see Fig. 2-C):

Take 10 kg of non-sticky rice → Soak it in water overnight → Grind it in a stone mortar → Pour two kinds of special rice liquor (a gold necklace and a silver coin were soaked in the rice liquor separately) into a broken lump of rice, while saying “Chol meas, prak hau meas, meas hau prak” (Gold enter, silver call gold, gold call silver) → Add plant A<sup>7)</sup> (4.45 kg) while saying “Prei hau srok, srok hau prei” (Wild call local, local call wild), old starters (150 g), rice bran (100 g), and sugar (10 g) and form into pieces (115 big pieces 8 cm in diameter and 2 cm high, each piece approximately 200 g; and 309 small pieces 3–4 cm in diameter and 2 cm high, each piece approximately 50 g) → Spread out a mosquito net, scatter powdered old starters (20 g) and rice husks, and place down the new starters → Sprinkle plant A (400 g) on the new starters using the fingers, spray the most potent rice liquor from the mouth over it several times, and scatter powdered old starters (70 g) → Put a few planks across a bed, and cover the new starters with mosquito nets for two nights → Dry under the sun for one to three days.

*Type II: Use of old starters without rice liquor (19 respondents)*

Subtype 1: Scattering old starters over the new ones (seven Khmer, three Krung, one Kravet, and one Lao)

[Case 6] A 43-year-old Khmer woman from Kouk Trach, Khnat, Puok, Siem Reap, described the process as follows:

Take 5 kg of non-sticky rice → Soak it in water overnight → Mix the rice with plants,<sup>8)</sup> palm sugar (500 g), and water and form into pieces (4–5 cm in diameter) → Put new starters on rice husks, scatter dried old starters (five pieces) and palm sugar, and cover with cloth for three nights → Dry under the sun for one to three days.

[Case 7] A 54-year-old Krung woman from Chruk Kuan, Kaoh Peak, Veun Sai, Ratanak Kiri, described the process as follows:

7) Plant A was a mixture of *chhe prei* (forest plants) and *chhe srok* (local plants). *Chhe prei*, consisting of #3, #15 (root), #17, #20, #24, #33, #34, #37, #39, #45, and the roots of some other plants (the total weight of the plants was nearly 10 kg), was boiled down to the correct consistency, and only this liquid was used. *Chhe srok*, consisting of #1 (300 g), #2 (two kinds: *rum'dé:ng srôk* and *rum'dé:ng prei*), #4 (200 g), #6 (500 g), #7 (two kinds: *khnhéi tek* and *khnhéi plē:ng*), #12 (100 g), #50, and #51 (the total weight of the plants was 3–4 kg), was dried and pounded.

8) #1 (100 g), #2 (two kinds: *rum'dé:ng srôk* 200 g and *rum'dé:ng prei* 200 g), #3 (200 g), #4 (50 g), #6 (100 g), #8 (10 g), and #11 (50 g) were pounded, usually when dried.

Take 1.25 kg of any kind of rice → Soak it in water for 30 minutes → Mix the rice with plant A<sup>9)</sup> and the supernatant solution of plant B<sup>10)</sup> and form into pieces (one large piece 7 cm in diameter and 3 cm high, and small pieces 4 cm in diameter and 2 cm high) → Put the new starters directly in a flat basket → Depress the centers of the starters and put one dried capsicum fruit into the big piece and powdered fruit into the small pieces to make the starters more potent (Fig. 2-D) → Scatter the powder of one large piece of old starter over them, and then cover with *la thuk* leaves and branches for two nights → Dry under the sun for one to three days with some pieces of charcoal and roots of *chonrok* (maybe *Boesenbergia pandurata*) to ward off evil spirits.

Subtype 2: Mixing old starters with rice powder (two Khmer, two Suoy, one Lun, and one Kachok)

[Case 8] An approximately 70-year-old Lun woman from Tha Ngaich, Ta Veang, Ta Veang, Ratanak Kiri, described the process as follows:

Take 2.5 kg of non-sticky rice → Wash and pound it (no soaking) → Mix rice with plants,<sup>11)</sup> powder of old starters (a half piece), and water and form into pieces (7–8 cm in diameter) → Put new starters on rice husks, covering them with leaves and branches of *la baa* (*khlông* in Khmer, *Dipterocarpus tuberculatus*), put some pieces of charcoal around the leaves to ward off evil spirits, and leave for five nights → Dry starters under the sun for two days and then keep them over the fireplace.

[Case 9] A 38-year-old Kachok man from Ka Peak, Kaoh Peak, Veun Sai, Ratanak Kiri, described the process as follows:

Take 2.5 kg of non-sticky rice → Soak it in water for 15 minutes → Mix the rice with plants,<sup>12)</sup> powder of old starters (three pieces), and water and form into pieces 5–6 cm in diameter and 3 cm high → Put the new starters on rice husks in flat baskets and depress the centers of the starters (Fig. 2-E) → Cover them with *kadho* leaves and branches for three nights → Dry under the sun and keep them over the fireplace.

9) #1 (dried), #2 (one piece), #5 (stem), #7 (one piece), #14, #16 (several fresh fruits and three leaves), and roots of seven other plants were pounded, usually when fresh.

10) #3 was soaked in water.

11) #1 (dried), #2 (one piece), #3, #5 (one stem), #7 (two pieces), and #14 (two pieces) were pounded, usually when fresh.

12) #1 (8–10 fruits) and #16 (3 fruits and 10–20 leaves) were dried and pounded.

Subtype 3: Both mixing and scattering old starters (one Khmer)

[Case 10] A 47-year-old Khmer woman in Kampong Chheu Teal, Sambour, Prasat Sambour, Kampong Thom, described the process as follows:

Take 50 kg of non-sticky rice (a floating rice variety called *chuong* is best because of its low price and the hardness of its grain) → Soak it in water for one to two hours → Grind it in a stone mortar → Mix rice with plants,<sup>13)</sup> powder from old starters (50 pieces), and salt water and form into pieces 4 cm in diameter → Put the new starters on rice straw, scatter with the powder of old starters (500 g), and cover them with cloths overnight → Remove the cloths and leave the new starters overnight → Dry under the sun for two days.

*Type III: Use of rice liquor without old starters (three respondents: two Tampuan and one Lao)*

[Case 11] A 29-year-old Tampuan woman from Pa Thot, Seda, Lumphat, Ratanak Kiri, described the process as follows:

Take 5 kg of sticky rice (occasionally non-sticky rice) → Soak it in water for 30 minutes → Pound rice and plants<sup>14)</sup> → Mix with water and form into pieces 7–8 cm in diameter → Put the new starters on leaves and branches of *tuum kok* (*donka:y* in Khmer, plant #20), blow strong rice liquor onto them, and cover them with *tuum kok* leaves and branches for five nights → Keep the starters in the house (no drying under the sun).

*Type IV: No use of rice liquor or old starters (30 respondents)*

Subtype 1: No drying of new starters under the sun; leaves and branches used for covering starters (one Tampuan, four Phnong, and five Jarai)

[Case 12] An approximately 50-year-old Jarai man from Proilei, Lum Choar, Ou Ya Dav, Ratanak Kiri, described the process as follows:

Take 7.5 kg of non-sticky rice → Soak it in water overnight → Pound the rice and dried plant A<sup>15)</sup> together → Mix with liquid from plant B<sup>16)</sup> and form into pieces 9–10 cm in diameter and 4–5 cm high → Put the new starters on rice husks and cover them with *dho* leaves and branches for 10 days to a month → Keep them over the fireplace (no drying under the sun).

13) #1 (500 g), #2 (1.5 kg), #3 (1 kg), #4 (750 g), #7 (125 g), #11 (750 g), #12 (250 g), and the roots of two plants (1.5 kg each) were dried and pounded.

14) #1 (100 g), #2 (2 kg), #3 (3 kg), #5 (one stem), #9 (2 kg), #32 (1 kg), *ton thoot* leaves, *sot ton mang* vines, and roots of the other three plants were used fresh.

15) #1 (250 g), #2 (one big piece), #5 (one stem), whole of *kaa bhlet*, and roots of the other five plants were used fresh.

16) #10 was cut and soaked in water for 10–15 minutes.

[Case 13] A 30-year-old Phnong woman from Maemoum, Sokh Sant, Kaoh Nheaek, Mondoul Kiri, described the process as follows:

Take 3 kg of non-sticky rice and 2 kg of sticky rice (mixed together) → Soak it in water for 30 minutes → Pound rice and dried plant A<sup>17)</sup> together → Mix with liquid from plant B<sup>18)</sup> and form into pieces 4–5 cm in diameter and 3–4 cm high → Put new starters on rice husks, put *kateh* (cotton) onto the starters while making the wish that mold will grow like cotton on them (Fig. 2-F), and cover them with any leaves for three nights → Keep them inside the house (no drying under the sun).

Subtype 2: Drying new starters under the sun (one Khmer, one Khmer Khe, two Brao, three Krung, 12 Phnong, and one Lao)

[Case 14] A 58-year-old Brao man from Katout, Kamphum, Sesan, Steung Treng, described the process as follows:

Take 10 kg of any rice (sticky rice is best) → Soak it in water overnight → Pound together rice and plant A<sup>19)</sup> (a total of 10 kg) → Mix with supernatant solution from plant B<sup>20)</sup> and form into pieces 7–8 cm in diameter and 4–5 cm high → Put the new starters on rice husks on a mat, and pierce them so as to be able to later hang them with bamboo threads over the fireplace → Put dried capsicum fruits on the starters to make them potent and smell better, and cover with leaves of *donka:y* (plant #20) for three nights → Dry them under the sun for seven days and keep them over the fireplace.

The use of sticky or non-sticky rice was not clearly classified into the four types and seemed to be more related to the rice in daily use than to starter production techniques. For example, the Khmer usually eat non-sticky rice while the Lao eat sticky rice (Table 3). However, nine people deliberately mixed sticky and non-sticky rice to produce starters (see Cases 3 and 13). It is not known whether this technique was introduced from elsewhere or originated in the places where it was used. Some respondents said that they used only broken rice for starter production because normal rice was needed for eating. Many respondents soaked the rice in water before pounding it, usually for at least several hours but sometimes for less than one hour (41 and 23 of 69 respondents, respectively), although five

17) #1 (4–5 fruits), #3 (one plateful), #9, #31 (one noodle bowlful), and leaves of *tong koroo* were dried.

18) #3 (a small amount) and #31 (a few pieces) were boiled and cooled.

19) #1, #2, #3, #20 (leaf), #23 (root), and *mphroot iel* and *mbeh* leaves were usually used fresh.

20) #3 was soaked in water.

**Table 3** Use of Rice Varieties, Old Starters, and Rice Liquor in the Production of Starters

	Rice				Old Starters		Rice Liquor	
	Non-sticky	Sticky	Mixture of Both	Any	Used	Not Used	Used	Not Used
Khmer	19	1	1	0	19	2	10	11
Khmer Khe	0	1	0	0	0	1	0	1
Suoy	2	0	0	0	2	0	0	2
Brao	1	0	0	1	0	2	0	2
Krung	4	0	0	2	2	4	0	6
Kravet	1	0	0	0	0	1	0	1
Lun	1	0	0	0	1	0	0	1
Tampuan	2	2	1	0	2	3	4	1
Phnong	8	1	4	3	0	16	0	16
Kachok	1	0	0	0	1	0	0	1
Jarai	4	1	1	0	1	5	1	5
Lao	2	3	2	0	3	4	5	2
Total	45	9	9	6	31	38	20	49

(see Case 8) said that it was not necessary to soak the rice in water.

The numbers of people using old starters and rice liquor are shown in Table 3. Almost all the Khmer interviewees used old fermentation starters, but only 12 of the 48 minority respondents (especially the Suoy, Tampuan, and Lao) did so. It is widely believed that new starters mixed with old ones will ferment more successfully and steadily than starters made without old ones, because old starters may promote the fermentation process. This technique seems to be an advanced one that may have different origins from the technique that does not incorporate the use of old starters.

Half of the Khmer respondents used rice liquor in the production process, but the minority peoples did not use it, with the exception of five Lao, four Tampuan, and one Jarai (Table 3). This is partly because Khmer, Suoy, and Lao people usually drink rice liquor and not rice wine, while the other minority people still drink rice wine—or did until recently. Some Tampuan respondents who used rice liquor in the starter production process said that their techniques might have been influenced by the Lao, and a Jarai woman using rice liquor said that she had bought the liquor from Lao people.

These results indicate that the techniques of types I and II are derived from “rice liquor culture,” because the processes used by almost all Khmer and Lao people belong to these two types. In contrast, the techniques of type IV (no use of old starters or rice liquor), which many minority people utilized, seem to be derived from “rice wine culture.” Type III, which had only three cases, seemed to be an intermediate between types I and IV.

Of the 69 respondents, 49 put new starters on rice husks (and rice straw) (Table 4). This technique seemed to be common to all four types of production and is also widely recognized throughout Southeast

**Table 4** Use of Rice Husks, Covering Materials Used, and Drying under the Sun before Keeping Starters inside the House

	Starters Put on Rice Husks		Covering Material Used for Starters			Starters Dried under the Sun	
	Yes	No	Plants	Cloths, Nets, Flat Baskets, etc.	None	Yes	No
Khmer	15	6	0	20	1	21	0
Khmer Khe	1	0	0	0	1	1	0
Suoy	0	2	0	2	0	2	0
Brao	2	0	1	1	0	2	0
Krung	3	3	6	0	0	6	0
Kravet	1	0	0	1	0	1	0
Lun	1	0	1	0	0	1	0
Tampuan	3	2	5	0	0	2	3
Phnong	11	5	11	4	1	12	4
Kachok	1	0	1	0	0	1	0
Jarai	6	0	6	0	0	1	5
Lao	5	2	2	4	1	7	0
Total	49	20	33	32	4	57	12

Asia [Yoshida 1993: 153–155] and India [Tamang *et al.* 1988; Tamang *et al.* 2007; Tamang 2010b]. However, the covering materials were quite different in “rice liquor culture” and “rice wine culture” (Table 4). Almost all Khmer, Suoy, and Lao respondents used cloths, flat baskets, and nets to cover new starters; but the other minority respondents usually used leaves and branches of plants, such as *mboong* or *la baa* among the Krung, *la baa* (*Dipterocarpus tuberculatus*) among the Lun, *tuum kok* (*Lepisanthes rubiginosa*) or banana among the Tampuan, *rlaan* (*sangkhae* in Khmer, *Combretum quadrangulare*) or banana among the Phnong, and *dho* among the Kachok and Jarai. It is known that fresh and dried ferns (*Glaphylopteriolopsis erubescens*) are used for covering starters in the Himalayan region [Tamang 2010b]. Mold and yeast, which are good for fermentation starters, adhere not only to rice husks and straw but also to the leaves of some plants [*ibid.*: 40; Ueda 1999: 124–125]. These results also indicate that type IV is different from types I and II and appears to be more of a prototype of the production process of fermentation starters.

Only some of the Tampuan, Phnong, and Jarai did not dry starters in the sun before storing them inside their homes (see Cases 11, 12 and 13; Table 4). These people left new starters, covered with leaves or branches, in the house for longer periods than the others—five to seven nights, or even almost a month. All cases without a drying process were classified into type IV, which indicates that this technique seems to be also one of the characteristics of “rice wine culture.”

#### IV Plants Used for Fermentation Starters

The plants used in making fermentation starters in Cambodia are shown in Table 2. The plants can be roughly divided into two categories, irrespective of the ethnic group that uses them: spices and herbs (*Capsicum* spp., *Alpinia* spp., *Piper* spp., *Allium sativum*, *Zingiber officinale*, *Illicium verum*, *Amomum krervanh*, *Cinnamomum* spp., etc.) and sweet ingredients (*Albizia* spp., *Cinnamomum* spp., *Saccharum officinarum*, and *ngam* or *ngamngaam* are used among minority groups). Plants used for starters in other regions in and near Southeast Asia are also listed in Table 5 for comparison with those in Cambodia.

The 10 plants most frequently used in Cambodia originated in the Old World, with the exception of capsicum (Table 2), which was introduced into Asia around the 16<sup>th</sup> century [Andrews 1993]. Spices and herbs that are known for their antimicrobial properties and which also stimulate mold and yeast [Dung *et al.* 2005; Saono *et al.* 1982] were used because these plants were said to be *kdaw* (hot), *har* (spicy), and *khlang* (strong), and it was believed that rice wine or liquor made with starters containing them would be hot and strong. Therefore, it is assumed that the use of capsicum did not originate in one place, but rather that capsicum was easily accepted as “one of the spices” in many places or cultures after its introduction into Cambodia. Some Phnong interviewees deliberately did not use capsicum for starters; for example, a 50-year-old woman from Treab, Thmei, Kracheh, Kracheh, and a 45-year-old woman from Pu Tru, Saen Monourom, Ou Reang, Mondolkiri, concurred in saying, “You will get diarrhea if you drink rice wine made with starters that use capsicum.” This also supports the hypothesis that the acceptance of capsicum depends on locality.

Plants such as *Albizia* spp., *Cinnamomum* spp., *Saccharum officinarum*, and *ngam* or *ngamngaam* were used in Cambodia because locals thought that rice wine or liquor made with starters containing them would taste sweet. Seven respondents (six Khmer and one Lao, belonging to types I and II) mixed sugar or palm sugar with rice powder to produce starters (see Cases 5 and 6), which is considered a modernized technique that does not incorporate plant materials. The saccharides act as nutrients that promote the growth of yeast and as the source of ethanol fermentation, which inhibits the growth of unwanted bacteria [Hayashida and Kinoshita 2004]. Sweet plants, such as *Albizia* spp., *Cinnamomum* spp., and *Saccharum officinarum*, and the juice of *Cocos nucifera* were also used in other regions (Table 5). This technique seems to be fundamental in the production of fermentation starters in Southeast Asia.



**Table 5** Plants Used for Fermentation Starters in Southeast Asia and Neighboring Regions

Region and Plants			
<b>Yunnan, China</b>	<i>Aconitum</i> sp. <sup>(1)</sup>	<i>Solanum</i> spp. (leaf, fruit) <sup>(4),(6)</sup>	<i>Cosmos caudatus</i> <sup>(4)</sup>
	<i>Rhododendron</i> sp. <sup>(1)</sup>	<i>Zingiber officinale</i> <sup>(4)</sup>	<i>Saccharum officinarum</i> <sup>(4)</sup>
	<i>Scutellaria</i> sp. <sup>(1)</sup>		<i>Zingiber officinale</i> <sup>(9)</sup>
		<b>Thailand</b>	
<b>Vietnam</b>		<i>Zingiber officinale</i> <sup>(7)</sup>	
	<i>Annonum tsoo-ko</i> <sup>(2),(3)</sup>		<b>Taiwan</b>
	<i>Asarum sieboldii</i> (root, leaf) <sup>(2),(3)</sup>		<i>Abrus precatorius</i> <sup>(4)</sup>
	<i>Atractylodes macrocephala</i> (tuber) <sup>(3)</sup>	<b>Malaysia</b>	<i>Blumea balsamifera</i> <sup>(4)</sup>
	<i>Cinnamomum cassia</i> (outer bark) <sup>(3)</sup>	Cinnamon <sup>(4)</sup>	<i>Chenopodium</i> spp. (seed) <sup>(4)</sup>
	<i>Curcuma longa</i> (tuber) <sup>(3)</sup>	<i>Piper nigrum</i> <sup>(4)</sup>	<i>Chrysanthemum</i> cf. <i>indicum</i> <sup>(4)</sup>
	<i>Foeniculum vulgare</i> (flower) <sup>(2),(3)</sup>	<i>Zingiber officinale</i> <sup>(4)</sup>	<i>Lysimachia fragrans</i> <sup>(4)</sup>
	<i>Glycyrrhiza uralensis</i> (root) <sup>(2),(3)</sup>		
	<i>Mentha arvensis</i> (leaf) <sup>(3)</sup>	<b>Indonesia</b>	<b>Myanmar</b>
	<i>Myristica fragrans</i> <sup>(2),(3)</sup>	<i>Allium cepa</i> <sup>(8)</sup>	<i>Allium sativum</i> <sup>(6)</sup>
	<i>Syzygium aromaticum</i> (flower) <sup>(2),(3)</sup>	<i>Alpinia</i> spp. (tuber) <sup>(8)</sup>	<i>Carica papaya</i> (leaf) <sup>(6)</sup>
		<i>Capsicum</i> spp. <sup>(8)</sup>	<i>Piper nigrum</i> <sup>(6)</sup>
<b>Laos</b>		<i>Cinnamomum parthenoxylon</i> <sup>(4)</sup>	<i>Solanum</i> spp. (fruit) <sup>(6)</sup>
	<i>Areca catechu</i> <sup>(4)</sup>	Cinnamon <sup>(8)</sup>	<i>Zingiber officinale</i> <sup>(10)</sup>
	<i>Capsicum</i> spp. <sup>(4)</sup>	<i>Citrus</i> spp. <sup>(8)</sup>	
	<i>Carica papaya</i> (leaf) <sup>(4)</sup>	<i>Cocos nucifera</i> (juice) <sup>(8)</sup>	<b>India, Nepal, etc.</b>
	<i>Cocos nucifera</i> (bark, root) <sup>(4)</sup>	<i>Foeniculum vulgare</i> <sup>(8)</sup>	<i>Albizia kalkora</i> (bark) <sup>(11)</sup>
	<i>Nicotiana tabacum</i> (leaf, root) <sup>(4)</sup>	<i>Piper nigrum</i> <sup>(8)</sup>	<i>Albizia myriophylla</i> (bark) <sup>(12),(13),(14)</sup>
	<i>Piper betel</i> <sup>(4)</sup>	<i>Saccharum officinarum</i> <sup>(8)</sup>	<i>Annonum subulatum</i> <sup>(15)</sup>
	<i>Saccharum officinarum</i> (leaf, stem) <sup>(4),(5)</sup>		<i>Artocarpus heterophyllus</i> (leaf) <sup>(4)</sup>
		<b>Philippines</b>	<i>Asclepias acida</i> <sup>(4)</sup>
		<i>Bidens pilosa</i> <sup>(4)</sup>	<i>Asplenium esculentum</i> (leaf) <sup>(4)</sup>

Note: (1) Yamaguchi and Umemoto [1996], (2) Dung *et al.* [2007], (3) Dung *et al.* [2005], (4) Yoshida [1993], (5) Kozaki *et al.* [2005], (6) Unpublished data, (7) Kozaki *et al.* [2002], (8) Sano *et al.* [1982], (9) Kozaki *et al.* [2008], (10) Ochiai [2008], (11) Pannei *et al.* [2007], (12) Jeyaram *et al.* [2008], (13) Singh and Singh [2006], (14) Tamang *et al.* [2007], (15) Das and Pandey [2007], (16) Tamang *et al.* [1988], (17) Tsuyoshi *et al.* [2005], (18) Kozaki *et al.* [2000], (19) Greeshma *et al.* [2006].

## V Rituals and Taboos in the Production of Fermentation Starters

The production of fermentation starters did not differ along gender lines, but many interviewees expressed the view that women usually produced the starters and men sometimes helped with the collection of plants or the pounding of rice and plants. Rituals and taboos in the process included “taboos against blood, pregnant women, and *kruu khemr* (traditional Khmer doctors),” “production by only one person or in a small room,” “taboos related to food,” “taboos related to sound,” and “use of charcoal and/or capsicum.”

*Taboos against blood (four Khmer and two Lao), pregnant women (two Khmer), and kruu khemr (two Khmer)*  
Menstruating women or persons who were injured and bleeding were not allowed to produce starters or visit the production place, and neither were pregnant women. Two of the Khmer interviewees said that *kruu khemr* were not allowed to visit the production place because the starter process might end in failure due to their curse. If the above unwelcome people visited a production place by accident, several pieces of starter were made with them so as to avoid production failure.

*Production by only one person (one Kravet, one Phnong, and one Kachok) or in a small room (four Khmer and two Lao)*

One Kravet, one Phnong, and one Kachok said that the entire process of making starters, from pounding to drying, should be carried out by only one person. The reason was not clear. Some Khmer and Lao said that the process—from mixing to making pieces—should be carried out by a few people in a small room. The Khmer in Case 6 said, “I don’t know the exact reason, but it might prevent someone from stealing our production techniques.”

*Taboos related to food: Sour fruits or materials reminiscent of sourness (two Khmer, four Krung, one Lun, 13 Phnong, and one Kachok), and strong smells (one Khmer and one Phnong)*

Sour fruits, such as lime and tamarind, or foods with a strong smell, such as *pra hoc* (salted and fermented fish), were not allowed to be eaten or even touched during the entire process (12 respondents) or during the pounding and the making of pieces (11 respondents). As a Lun respondent stated, “If you eat or touch sour fruits during the production process, rice wine made with the starters will be sour. If you eat the tip of *chab at* (*phdau* in Khmer; climbing plants of the *Palmae* family) or sugarcane during the process, the rice wine will be sweet because they are sweet” (see Case 8). It was generally accepted that people connected the “sour” taste of fruits with the “sour” taste of rice wine, which indicated

unsuccessful fermentation.

A similar view was expressed by a 40-year-old Khmer woman from Phdlek, Phan Nheum, Prasat Balangk, Kampong Thom, who said, “Something sounding like *saap* (tasteless), for example, a fishing implement called *saap* and a tree called *leang saap* (*Lansium domesticum*), should not be close to the place where new starters are produced; otherwise the rice liquor made with the starters will be *saap*.”

*Taboos related to sound: Loud voices (one Khmer and seven Phnong), getting angry or fighting (one Khmer and two Phnong), singing songs (four Phnong)*

Talking loudly, getting angry, fighting, and singing songs were not allowed during the time of pounding and making pieces. A 50-year-old woman from Pon Ta Chea, Ou Krieng, Sambour, Kracheh, claimed: “Rice wine made using starters that were produced when there was a loud voice during pounding will make people drunk and fight with each other.”

A 46-year-old woman from Kong Rae, Sokh Sant, Kaoh Nheak, Mondoul Kiri, said, “You should not sing songs or talk loudly while pounding or making pieces, to protect starters from evil spirits.”

From a practical point of view, these taboos seem to prevent new starters from bacterial contamination. As a Tampuan woman (Case 11) explained, “You should not touch the ground while you are pounding. If you do, the rice liquor made with the starters will give you a headache.” This comment seems to reflect the same meaning.

*Use of charcoal and/or capsicum (three Khmer, two Brao, two Krung, one Lun, and one Lao)*

People in Cambodia use charcoal and/or capsicum fruits in rituals when they produce starters. Some respondents used both charcoal and capsicum (see Cases 2 and 7), while some used only charcoal (see Case 8) and others used only capsicum (see Case 14). A 46-year-old Lao woman from Phluk, Phluk, Sesan, Steung, Treng, said, “I put a few pieces of charcoal on the cloths covering starters,” and a 60-year-old woman from Loak, Loak, Ou Chum, Ratanak Kiri, said, “I put two pieces of charcoal in front of the place where the starters are covered.”

A 50-year-old Brao man from Paiyang, Ta Veang, Ta Veang, Ratanak Kiri (see Fig. 2-G), stated, “I keep pieces of starters in a bamboo container with capsicum as an insect repellent.” Many Phnong people use charcoal in the production of fermentation starters.

Some people also use charcoal and/or capsicum in fermented rice production rituals or when boiling rice for rice liquor. A Suoy woman from Kaoh Doun Teay, Trapeang Chour, Aoral, Kampong Speu, said, “After putting the mixture of rice and starters into a jar for fermentation, I trace the rim and body

of the jar with a piece of charcoal three times each and put the charcoal into the mixture.”

A 64-year-old Khmer woman from Thum, Srae Ronoung, Tram Kok, Takaev, said, “*App* [a kind of evil spirit] likes to drink the liquid of *tapae* [fermented rice], and the *tapae* will go bad [unsuccessful fermentation] if the *app* touches the *tapae*. Thus, I used to put capsicum fruits or thorny plants on the lid of the pot in which pieces of *tapae* were fermenting, to protect them from *app*.”

A Khmer woman (Case 1) explained, “I put a few pieces of charcoal on the lid of the pot when boiling rice for rice liquor.”

Yoshida [1993] reported the use of charcoal and capsicum in starter production rituals among the Lao, Thai Dam, Thai Neua, Yao, and Khmu in Laos, and the Murut and Rungus in Borneo; and the same ritual was also found in the Chin state in Myanmar [Ochiai 2008: 244]. Makers of *marcha* (a starter in Nepal, Bhutan, the Darjeeling hills, and Sikkim) believe that the addition of capsicum peppers and ginger during *marcha* preparation wards off devils that may spoil the product; and makers of *khekhrii* (fermented germinated rice in Nagaland) add two pieces of charcoal into the jar when germinating rice [Tamang 2010b: 187–227]. Yoshida [1993: 155–158] suggested that the use of charcoal and capsicum in rituals might have been introduced into Borneo as “one set” from mainland Southeast Asia sometime after the 15<sup>th</sup> century. The same use was confirmed in Cambodia, which lies between the two regions surveyed by Yoshida, seeming to somewhat support his hypothesis. However, Shimomoto [1984: 218] reported that the Rungus used charcoal and capsicum as “burning” symbols and that these two could render rice wine more “burning” (potent) in rituals, which is very similar to the Cambodians’ idea that rice wine or liquor made with starters containing “hot” and “spicy” plants will be hot and strong. Therefore, it is still unknown whether these techniques originated in one place and were dispersed to other regions (as per Yoshida’s hypothesis), or whether they originated in various places with certain cultural backgrounds. More studies on this ritual are necessary to shed light on its origins and dispersal.

### *Others*

The Phnong (eight of 16 respondents) put cotton on new starters before covering them, reflecting the wish that mold would grow like cotton (see Case 13 and Fig. 2-F). This practice was not observed among other ethnic groups. Three Phnong people said that during the whole production process they could not wash their hair with liquid left over from boiling rice, which is a normal practice among the Phnong. Moreover, three Phnong respondents explained that just after removing the leaves covering the starters—and before drying them—they held burning leaves or weeds over the starters while making a wish that the latter would be good. Phnong people still have unique and distinctive rituals and taboos related to starter production.

A 35-year-old Khmer man in Srae Nouy, Srae Nouy, Varin, Siem Reap, stated, “When you go to collect plants in the bush or mountains, you should go there under the pretense of being drunk. If so, the rice liquor made with starters including these plants will make people drunk.” Other stories included casting spells during the process (see Cases 3 and 5).

The rituals and taboos found in Cambodia, such as the taboo against sour fruits and materials, taboos related to sounds, putting cotton on the new starters, and the use of charcoal and capsicum, probably play an important role in elucidating the dispersal routes of starters in Southeast Asia, but to date there have been very few reports on the rituals related to the production of alcoholic beverages containing starters in Southeast Asia. More detailed studies on these rituals are necessary to discern the origins and dispersal routes of starters.

## VI Conclusions

This study described 14 cases of starter production in detail. Spices, herbs, and sweet ingredients are widely used in Cambodia, and many people put new starters on rice husks (or rice straw). These techniques are broadly distributed throughout Southeast Asia and are considered fundamental for starter production in this region. It is assumed that these techniques originated in one place (perhaps China) and were later dispersed throughout Southeast Asia. Furthermore, two different lines of production were confirmed in Cambodia: one based on “rice wine culture”—characterized by no use of rice liquor and old starters, the use of leaves and branches for covering, and no drying process; and the other based on “rice liquor culture”—characterized by the use of rice liquor (blown on) and old starters (scattered on new starters and/or mixed with rice powder) and the addition of sugar without using plant materials. The process based on “rice wine culture” seems to be older than that based on “rice liquor culture,” suggesting that new techniques belonging to “rice liquor culture” could have infiltrated the “rice wine culture” of Cambodia. Not only the production processes but also plant use and related rituals should be studied and compared to elucidate the origins and dispersal routes of starters in Southeast Asia.

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